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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Applicant: Chung-En Kao

Group Art Unit: 1753 ✓

Serial No.: 09/976, 082

Examiner: Steven H. Versteeg

Filed: Oct. 12, 2001

For: Apparatus and Method for Self-Centering a Wafer
in a Sputter Chamber

Attorney Docket No.: 67,200-530

EXPRESS MAIL CERTIFICATE

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Kathy Dixon

REVISED APPEAL BRIEF

Mail Stop: Appeal
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Appellant appeals in the captioned application from the Examiner's final rejection dated April 7, 2003, of claims 1, 3-5 and 7-14, under 35 USC §103(a) as being unpatentable over Banholzer et al '198 in view of Lamont Jr. '556.

It is urged that the rejection be reversed and that all the claims be allowed.

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(1) REAL PARTY IN INTEREST

The real party in interest in the present appeal is the recorded Assignee of Taiwan Semiconductor Manufacturing Company, Ltd.

(2) RELATED APPEALS AND INTERFERENCES

There are no other appeals or interferences that are known to the Appellant, the Appellant's legal representative, or the assignee.

(3) STATUS OF CLAIMS

Claims 1, 3-5 and 7-15 are pending in the application.

Claims 1, 3-5 and 7-15 stand rejected.

(4) STATUS OF AMENDMENTS

A Request For Reconsideration was filed on or about June 9, 2003. The claim amendments in the Request for Reconsideration were not entered.

An Advisory Action was received from the Examiner dated July 15, 2003, maintaining the rejection of all claims.

A Notice of Appeal was filed on or about July 7, 2003.

(5) SUMMARY OF THE INVENTION

The invention relates to an apparatus and a method for self-centering a wafer onto a wafer pedestal situated in a physical vapor deposition chamber.

(Specification, paragraph 001; drawings Figs. 3-4C)

In a preferred embodiment, a wafer lifter for self-centering a wafer on a pedestal may be provided which includes a lifter body of annular shape that has a center cavity with a diameter that is larger than a diameter of the wafer pedestal; at least four support fingers emanating upwardly from the lifter body and are spaced-apart from each other; and a platform on a tip portion of each of the at least four support fingers defined by a surface slanted from a vertical plane of an outside surface of the support finger; the platform, when supporting a wafer thereon, leaves substantially no gap between the slanted surface and an outer periphery of the wafer.

(Specification, paragraph 016; drawing Figs. 3-4C)

The present invention is further directed to a method for self-centering a wafer on a wafer pedestal which can be carried out by the operating steps of first providing a wafer lifter that includes a lifter body of annular shape that has a center cavity with a diameter that is larger than a diameter of the wafer

pedestal, at least four support fingers emanating upwardly from the lifter body and are spaced-apart from each other, and a platform on a tip portion of each of the at least four support fingers defined by a slanted surface from a vertical plane of an outside surface of the support finger, the platform when supporting a wafer thereon leaves no gap between the slanted surface and an outer periphery of the wafer; positioning a wafer on the wafer lifter supported by the platform on the tip portion of the at least four support fingers; and lifting the wafer lifter to a position over the wafer pedestal and depositing the wafer onto the pedestal.

(Specification, paragraph 018; drawings Figs. 3-4C)

(6) ISSUE

Issue I

Is the rejection of claims 3 and 15 under 35 USC §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention proper?

Issue II

Is the rejection of claims 1, 4-5 and 7-14 under 35 USC §103(a) as being unpatentable over Banholzer et al '198 and Lamont Jr. '556 proper when such references do not teach or suggest the specifically claimed limitations in the present application?

(7) GROUPING OF CLAIMS

The rejection of claims 1, 4-5 and 7-14 are contested as a group. The claims stand or fall together.

The rejection of claim 3 is rejected as a separate group.

(8) ARGUMENTS

Issue I

Claims 3 and 15 are rejected under 35 USC §112, second paragraph. In the final Office Action dated April 7, 2003, claim 3 was rejected for being dependent upon claim 2. In the Request for Reconsideration, the Appellant amended the dependency of claim 3 to claim 1. However, in the Advisory Action, the Examiner maintained the rejection of claim 3 as containing an antecedent basis problem. The Appellant will prepare a supplemental amendment to change "said slanted shoulder portion" to "a slanted shoulder portion", if such amendment is allowed. There is no art rejection on claim 3.

Claim 15 was cancelled in the Request for Reconsideration dated June 9, 2003. While such amendment was not entered by the Examiner, the Appellant would be glad to file a Petition to the Commissioner to have the amendment entered under 37 CFR 1.116,

"Amendments presenting rejected claims in better form for consideration on appeal may be admitted".

Issue II

Claims 1, 4-5 and 7-14 are rejected under 35 USC §103(a) as being unpatentable over Banholzer et al '198 in view of Lamont, Jr. '556. It is contended that Banholzer et al disclose a method for placing a substrate on the pedestal which has a wafer support ring and wafer lifters including a lifter body of annular shape that has a center cavity with a diameter larger than the diameter of the wafer pedestal; four support fingers; and platform defined by slanted surfaces from a vertical plane. It is further contended that while Banholzer et al does not disclose the material of the lift member or the material sputter deposited, such are disclosed by Lamont, Jr. in a method for **preventing contamination of a wafer during sputtering**, that all components within the sputter chamber should be coated with the material to be deposited.

The rejection of claims 1, 4, 5 and 7-14 under 35 USC §103(a) based on Banholzer et al and Lamont, Jr. is improper and must be reversed.

The Appellant respectfully submits that Banholzer et al and Lamont, Jr., either singularly or in combination thereof, does not teach a lift body that is fabricated of a material which has a rigidity of at least that of aluminum, or the step of fabricating a lift body for a wafer lifter with aluminum or stainless steel. Regarding the Examiner's contention that "Lamont, Jr. discloses ... all components within the sputter chamber should be coated with the material to be deposited" and further "to modify the invention of Banholzer to use aluminum as the material for the lift body because of the desire to prevent contamination when sputtering aluminum", the Appellant respectfully submits that such are not the present invention, i.e. the present invention does not aim at preventing contamination. Instead, the present invention teaches that the **lift body must be fabricated of a material of sufficient rigidity, i.e. at least that of aluminum, or fabricated of aluminum or stainless steel, such that the lift body can sustain the high process temperature of the sputter chamber.** Such criticality is clearly presented in the specification on page 14, lines 7-11:

"The design is such that when the wafer lifter is used in a fabrication process, the high temperature of the sputter chamber expands the wafer lifter and thus a small gap, such as 0.5 mm, between the wafer and the slanted shoulder portion is provided."

In the Response to Argument section of the 04/07/2003 Office Action, the Examiner argued that:

"Applicant has argued that Lamont, Jr. aims at preventing contamination whereas Applicant has a different purpose. That appears to be the only argument. Applicant's has not claimed a different purpose. there is motivation to combine the references. In essence, Applicant has argued that because there is a different reason for combining the references than Applicant's invention, the invention is not obvious. On that argument, the Examiner must disagree."

The Appellant respectfully submits that the Applicant has not argued that because there is a different reason for combining the references than Appellant's invention, the invention is not obvious. Instead, the arguments of the Appellant is such that **even when the Banholzer et al and Lamont, Jr. references are combined, the requirement of fabricating a lift body of a material that has a rigidity of at least that of aluminum is neither taught or disclosed by the references.**

The rejection of claims 1, 4, 5 and 7-14 under 35 USC §103(a) based on Banholzer et al and Lamont, Jr. is improper and must be reversed.

CLOSING

In summary, the Appellant has shown that his claimed invention is fully supported by a body of evidence of non-obviousness. It is therefore respectfully submitted that such evidence of non-obviousness overcomes any showing of obviousness presented by the Examiner. The Appellant therefore submits that the final rejection of his claims 1, 3-5 and 7-14 is improper under 35 USC §103(a).

The reversal of the final rejection is respectfully solicited from the Board.

Respectfully submitted,

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CLAIM APPENDIX

1. A wafer lifter for self-centering a wafer on a pedestal comprising:

a lifter body of annular shape having a center cavity with a diameter that is larger than a diameter of the wafer pedestal, said lifter body is fabricated of a material that has a rigidity of at least that of aluminum;

at least four support fingers emanating upwardly from said lifter body and are spaced-apart from each other; and

a platform on a tip portion of each of said at least four support fingers defined by a slanted surface from a vertical plane of an outside surface of said support finger, said platform when supporting a wafer thereon leaves substantially no gap between said slanted surface and an outer periphery of the wafer.

3. A wafer lifter for self-centering a wafer on a pedestal according to claim 2, wherein a base of said slanted shoulder portion of the support finger defines a diameter of a circular area surrounded by the platforms of the at least four support fingers which is not larger than a diameter of said wafer when measured at 23°C.

4. A wafer lifter for self-centering a wafer on a pedestal according to claim 1, wherein said at least four support fingers are substantially equally spaced-apart from each other.

5. A wafer lifter for self-centering a wafer on a pedestal according to claim 1, wherein said platform when supporting a wafer thereon leaves a gap smaller than 0.5 mm between said slanted surface and said outer periphery of the wafer.

7. A wafer lifter for self-centering a wafer on a pedestal according to claim 1, wherein said lifter is equipped with four support fingers emanating upwardly from said body.

8. A wafer lifter for self-centering a wafer on a pedestal according to claim 1, wherein said lifter body is equipped with four support fingers emanating upwardly from said body at a 90° angle from a horizontal plane of said body.

9. A wafer lifter for self-centering a wafer on a pedestal according to claim 1, wherein said lifter body has a ring shape.

10. A method for self-centering a wafer on a wafer pedestal comprising the steps of:

 fabricating a lifter body for a wafer lifter with aluminum or stainless steel, said lifter body having an annular shape and a center cavity with a diameter that is larger than a diameter of said wafer pedestal, said wafer lifter further having at least four support fingers emanating upwardly from said lifter body and are spaced-apart from each other, and a platform on a tip portion of each of said at least four support fingers defined by a slanted surface from a vertical plane of an outside surface of said support finger, said platform when supporting a wafer thereon leaves substantially no gap between said slanted surface and an outer periphery of the wafer;

 positioning a wafer on said wafer lifter supported by said platform on said tip portion of the at least four support fingers; and

 lifting said wafer lifter to a position over said wafer pedestal and depositing said wafer onto said pedestal.

11. A method for self-centering a wafer on a wafer pedestal according to claim 10 further comprising the step, after said lifting step, of lowering said wafer lifter to deposit said wafer onto said wafer pedestal.

12. A method for self-centering a wafer on a wafer pedestal according to claim 10 further comprising the step of sputter depositing a metal layer on a top surface of said wafer.

13. A method for self-centering a wafer on a wafer pedestal according to claim 10 further comprising the step of self-centering the wafer on said wafer lifter during said positioning when said wafer is guided into a center position by said slanted surface on said tip portion of the at least four support fingers.

14. A method for self-centering a wafer on a wafer pedestal according to claim 10 further comprising the step of providing four support fingers that are vertically mounted on said lifter body.

15. A method for self-centering a wafer on a wafer pedestal according to claim 10 further comprising the step of fabricating said lifter body with a material that has a rigidity of at least that of aluminum.